Letters

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The narrow cold-frontal rainband of 22/23 November 2013

The recent paper in *Weather* by Young (2014) provided a detailed analysis of an intensive cold front as it passed over the UK on 22/23 November 2013. This was an extremely good example of 'linear convection', as it is described in the paper, or a 'narrow cold-frontal rainband' (NCFR; Hobbs and Biswas, 1979). These features are associated with a low-level jet that lies ahead and parallel to the surface cold front, generating a band of intense but relatively shallow convection (see Koch and Kocin, 1991). Although the structure associated with these systems is not uncommon (e.g. Gatzen, 2011), this case was notable for the (linear) length and the longevity of the feature. Critically, fine-scale radar observations using the 1km, 5min UK composite radar product, produced by the UK Met Office and supplied by the British Atmospheric Data Centre, enabled the timing and progression of the most intense band of this feature to be examined (see Figure 1).

Analysis of the radar data for this case showed that the intense rain band within the broader region of the cold front was identifiable for just under 24h, from about 0730 UTC on 22 November to about 0530 UTC on 23 November, as the front progressed across the UK and into the near continent. The first indication of the intense rain band is noted over the Irish Sea at 0730 UTC, and later off the southwest approaches at 1000 UTC. By 1230 UTC the feature was extremely well defined off Cornwall and

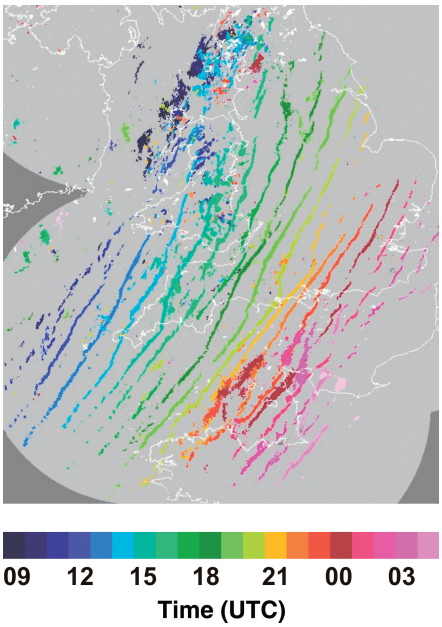

Figure 1. Extent of precipitation >10mmh^{-1} on each hour (UTC) for 22/23 November 2012, derived from the UK MetOffice 1km, 5min composite radar product.

had started to encroach on the mainland by 1345 UTC. Although the line of precipitation was generally unbroken, some gaps appeared as it progressed eastwards. For example, at about 1715 UTC a 10km east–west gap appeared between the southernmost part of the rain band and the northernmost part. These features are described by Moore (1985) as 'core-and-gap structures' and have been attributed to the vortices that fracture the precipitation band along the cold front; such features are also described by Hagen (1992) in a study near the Alps. However, there is little indication of any significant interaction between the rain band and the surface topography, despite the probable height of the low-level jet. The greatest length of the band occurred at about 1745 UTC, when the most intense band of precipitation (>10mmh^{-1}) stretched nearly 800km from the west of the Brest peninsular, across Lyme Bay and central England, and northwards to Redcar in the northeast. As the band progressed eastwards it started to lose its identity, although remnants could be seen as it passed into the near continent and out of range of the high-resolution radar imagery.

These narrow cold-frontal rain bands are often accompanied by hazardous weather such as intense rainfall and localised squally winds. As Young notes in his paper, these rain bands probably occur often over regions (such as the sea) where data is sparse and therefore go unnoticed: the availability of observations at the sub-feature scale is critical in evaluating and understanding the processes of these features.

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doi:10.1002/wea.2505